

ON THE MOLLUSCAN FAUNA OF THE PATAGONIAN
TERTIARY.

BY H. VON IHERING.

(Plate XIX.)

(Read April 3, 1902.)

During the last ten years the exploration of the Patagonian and Argentine Tertiary has been very actively prosecuted, but the results of the new studies have not always represented genuine progress.

This refers particularly to the deposits of Entre Rios, which Alessandri regarded as Eocene from his studies of Selachian teeth, while A. Smith Woodward, reëxamining the same material, came to the conclusion that this formation is Miocene or Pliocene. The study of the Mollusca of the Entre Rios beds led me to the opinion that they are Miocene, while Borchert, in view of the large proportion of recent species in this fauna, refers the formation to the Pliocene.

Having at my disposal one of the best collections of marine shells from the Brazilian and Argentinian coasts, I have carefully examined Borchert's work. This author has had access to a much richer collection of Entre Rios mollusks than I myself, in which are represented well-preserved examples of some species—*e. g.*, *Cardium magnum* Born—of which I have seen only casts. This circumstance does not, however, entirely explain the divergence of our opinions, which is rather due to a number of incorrect determinations by Borchert. The small shell which he believes to be *Dione purpurata* Lam. is not referable to that species. The opinion that the young shell differs in outline from that of the adult is refuted by the large series of specimens in my collection. It is not reasonable to attach much importance to such young shells, especially if represented only by a single specimen.

"*Cryptogramma brasiliiana* Gm." is not this species at all, but a different and extinct species, characterized by its numerous coarse concentric ribs, as also by numerous radiating striæ. Beside these two species, the following are certainly erroneously determined :

Lithodomus patagonicus d'Orb.*Modiola tulipa* Lam.*Nucula puelchana* d'Orb.*Tivela argentina* Sowb.*Solecurtus platensis* d'Orb.*Marginella prunum* Gm.*Columbella acuta* Stearns.

Of the nineteen species which the author regards as still existing at least nine are incorrectly determined. Admitting that the remaining ten species are accurately determined, the proportion of living species in the Paraná formation is as 10 : 60, or 17 per cent.

Borchert's attempt to prove that the Paraná formation is Pliocene must be regarded as a failure; it is opposed to the opinion of d'Orbigny, Philippi and von Ihering, all of whom were well acquainted with South American marine Mollusca, both recent and fossil. *We must continue to regard the Paraná formation as Miocene, while the Pliocene of Argentina is represented in the south by the Cape Fairweather beds, and in the north by the Tehuelche formation.* Of the latter the new collection of Carlos Ameghino contains an instructive representation, with many new species of *Pectinidæ*, *Carditidæ* and *Veneridæ*.

From the marine deposits in the upper part of the *Pampean formation* I have a relatively large collection. As the species are all still living, I am obliged at present to consider the "Pampeano superior" of Ameghino as *Pleistocene*. It is interesting to observe that in this formation are two different horizons, the older of which contains *Ostrea arborea* Ch., *Purpura hæmastoma* L., and other species now common on the Brazilian coast, but which are wanting in the later horizon, where they are replaced by *Ostrea puelchana* d'Orb. and other Patagonian species.

With regard to the *Patagonian formation*, many new forms are contained in a large collection sent to me this year by Dr. Florentino Ameghino, and gathered by his brother Carlos in the years 1899 and 1900. This great collection contains representatives of three different faunas, but the greater part of it comes from the Patagonian formation. As I have studied many important collections from this formation, and as my friend Dr. A. E. Ortmann has also discovered many new forms in the collections of the Princeton Expedition, it was very surprising to find a great number of new and interesting forms in this new collection. I reserve the description of these new species until Dr. Ortmann's report has been published, and describe here only two of the most striking new species.

NAUTILUS CAROLI-AMEGHINOI, sp. nov.

(Plate XIX, Figs. 1, 2.)

Nautilus testa suborbiculari, imperforata, lævi, suturis simplicibus, siphone interno, in fundo fossæ latæ situ.

The shell, which is filled with matrix and not very well preserved, is of suborbicular shape, subcompressed and much enlarged toward the aperture. The outer or peripheral part of the shell is rounded, smooth and with simple sutures. There is no umbilicus, but a pit at the central point of origin of the outer lip of the body-chamber. In this groove, the wall of which covers the umbilicus, there is, opposite to the origin of the outer lip, a crista, the prolongation of which passes into the dorsal wall of the body-chamber. The siphon is placed at the bottom of a large and deep hollow, which has an internal situation—that is to say, nearer to the dorsal than to the ventral or external margin of the septum.

Measurements.

Major diameter	74 mm.
Minor "	58 "
Body-chamber, length	42 "
" " breadth, central	34 "
" " " in the middle	29 "

I take great pleasure in dedicating this new species, which is the first representative of the class Cephalopoda from the Tertiary of Patagonia, to Mr. Carlos Ameghino, whose excellent work in the geological exploration of Patagonia I appreciate very highly.

Locality: Golfo de San Jorge, Cabo Tres Puntas.

Formation: "Patagonico medio."

NEOINOCERAMUS AMEGHINOI, gen. et sp. nov.

(Plate XIX, Figs. 3, 4.)

Testa solida, compressa, oblique-ovata, antice posticeque paullulum hiante, concentrice laminato-costata, laminis altis subreflexis distantibus, interstitiis lævibus; auriculis anticis magnis, posticis minoribus; area ligamentale lata brevi.

The shell is large, solid, very obliquely ovate, slightly compressed and gaping on both sides. The anterior lateral margin is convex, passing gradually into the arched ventral margin; the posterior

margin is concave below the posterior auricle, then becoming convex, passes gradually into the arched ventral margin; the ventral extremity is obliquely produced and convex. The outer surface is provided with numerous concentric ribs, which are three to four millimetres high and slightly reflected along the free margin; the number of these lamellæ amounts to eighteen in the ventral half of the shell; the upper or dorsal half is somewhat defective in the central part. The distance between the ribs is, in general, equal to their height, but there is some irregularity in their size and spacing. Between the ribs the surface of the shell is smooth.

The ligamental area, which is thirty millimetres in length, is destroyed in the central part, as is also the umbo, the situation of which must have been nearly central. The posterior auricle is small, but well developed; the anterior is broken away, but must have been much larger than the posterior. The lateral remnants of the ligamental area are strong, eight millimetres broad and obliquely striated by narrow grooves, separated by small ribs, which are the *direct continuation* of the ribs of the outer surface. It is a remarkable fact that the concentric ribs of the outer surface do not converge toward the umbo, but toward the dorsal margin of the ligamentous area. The inside of the shell shows the simple pallial line, which is distant seven millimetres from the anterior lateral margin and twenty millimetres from the ventral margin. Behind the posterior auricle the shell slopes abruptly toward the margin, while at the anterior margin the transition is gradual. It is impossible to recognize the muscular impressions.

Measurements.

Length, from anterior auricle to posterior ventral extremity	95 mm.
Breadth	60 "
Diameter of half-shell	22 "

Another specimen, represented only by the ventral extremity, must have had a length of at least 150 millimetres.

Locality: Golfo de San Jorge, east of Punta Nova.

Formation: Lower part of the Patagonian.

It is not easy to define the systematic position of this species, because the umbo and the central part of the ligamentous area are wanting. The multivincular ligament, the oblique-ovate shape and

the concentric ribs indicate a relationship to the genus *Inoceramus*, from which however it is distinguished by the short and broad ligamental area and the well-developed auricles of the dorsal margin. I regard the species therefore as the representative of a new genus, of which I offer the following diagnosis.

NEOINOCERAMUS, gen. nov.

Genus *Aviculidarum* testa æquivalvi, oblique-ovata, biauriculata, concentric costata, cardine recto, crasso brevi oblique-sulcato.

I believe this genus to be nearly allied to *Inoceramus*, the species of which are exclusively Mesozoic. Although, because of the incomplete preservation of the specimen described, the systematic position of the genus is not definitely fixed, there can be no doubt that this species represents one of the most remarkable discoveries of Mr. Carlos Ameghino's later expeditions.

I have much pleasure in dedicating this exceedingly interesting species to my friend Dr. Florentino Ameghino, not only in appreciation of his excellent palæontological work, but also as an acknowledgment of the liberality with which he has confided to me the study of the invertebrates of his collection, permitting the types to remain in the Museu Paulista, which for this reason possesses the finest existing collection of Patagonian invertebrates. Of these two new species, one is the first representative of the Cephalopoda from the Tertiary of Patagonia, the other is a new type of Pelecypoda, nearly allied to the Mesozoic genus *Inoceramus*. The collection is also rich in Corals and Echinoderms; among the latter, the study of which I have entrusted to Mr. Lorient le Fort, are also Crinoidea.

With reference to the paper of Mr. Hatcher, I have examined the question of the significance of the Patagonian and Suprapatagonian beds, which Mr. Hatcher regards as only different facies of a single formation. The fact that some species are common to both horizons and that the number of such common species increases with the progress of investigation, induced me for a time to agree with Mr. Hatcher's opinion. It was therefore of importance for me to reëxamine the question with reference to the new material, which was not derived from Santa Cruz, but from northern Patagonia. The result was not favorable to Mr. Hatcher's views. This may be seen from my paper on "The History of the Argentine

Oysters," which will soon be published in the *Comunicaciones del Museo Nacional de Buenos Aires*. Like the species of *Ostrea*, those of *Struthiolaria* are also characteristic fossils of the Patagonian and Suprapatagonian beds, which represent two different sections in one great formation.

Of great interest in this new collection are the fossils from the *Pyrotherium* beds, collected on the Rio Chico, a tributary of the Rio Chubut, and the Golfo San Jorge. Among the mollusks are characteristic *Gryphæa concors* Ih., and *G. pyrotheriorum* Ih., and *Ostrea ameghinoi*. Of species characteristic of the Patagonian formation only two occur: *Cardita patagonica* Sow. var., and *Rhynchonella plicigera* Ih. Among the new species may be mentioned *Bouchardia patagonica*, *Turritella malaspina*, *Struthiolaria striatissima* and *Rostellaria cossmanni*. The last-named species is a representative of a genus which does not occur in the other Patagonian Tertiary formations. In this collection there are neither existing nor Mesozoic species, and I therefore believe the *Pyrotherium* beds to be Eocene, while Florentino Ameghino regards them as Cretaceous.

The general results given in my paper in the *Revista do Museu Paulista*, Vol. II (abstract in English, p. 372 ff.), have not been essentially changed, either by my later investigations or by those of Dr. Ortmann. It is therefore singular that Mr. Pfeffer has, in the past year, repeated his erroneous theory as to the existence of a uniform Eocene marine fauna. Even if we leave out of account the Eocene formations of Patagonia, Chile and New Zealand, we must consider such elementary faunistic facts as the distribution of the Nummulites, which in the northern hemisphere extend from North America to Europe and Asia as far as the Sunda Islands, while they are wanting in the southern hemisphere. These facts cannot be explained by supposed differences of temperature, but only by geographical modifications, for the study of which a knowledge of the Tertiary Mollusca offers one of the most important means.

SÃO PAULO, BRAZIL, October 28, 1901.